

**NIRMA UNIVERSITY**  
**Institute of Technology**  
**B. Tech. Computer Science and Engineering**  
**Open Elective (open to all branches except Dept. of CSE)**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
2	0	2	3

<b>Course Code</b>	2CSOE52
<b>Course Title</b>	Data Structures

**Course Outcomes:**

At the end of the course, students will be able to –

1. illustrate various data structures for efficient data storage and retrieval
2. correlate various data structure in algorithm design
3. analyse various searching, sorting, and indexing algorithms.

**Syllabus:**

**Teaching  
Hour**  
**02**

**Unit I**

**Introduction to Data Structures:** Types of Data Structures, Linear & linear data structures

**Unit II**

**Linear data structures & their sequential storage representation:** Storage Structures for arrays, introduction to stack, operations and applications of stack, Introduction to queue, operations of queue, operations and applications of queue, Linked list basics, types, operations and applications

**06**

**Unit III**

**Non Linear data structures:** Trees-Definitions and concepts, operations on Binary Trees, Storage Representation and Manipulation of Binary Trees-Linked & Threaded, Conversion Of General Trees To Binary Trees, Sequential and other representations of trees, applications of Trees-the Manipulation of Arithmetic Expressions, Multi Linked Structures-Sparse Matrices.

**06**

**Unit IV**

**Graphs-Matrix:** Graphs-Matrix representation of graphs, Breadth First Search, Depth First Search, Spanning Trees.

**02**

**Unit V**

**Sorting:** Sorting-Notation and Concepts, Time and Space Complexity, Asymptotic behaviour, Sorting: Insertion Sort, Selection Sort, Bubble Sort, Merge Sort, Tree Sort, Quick Sort, Shell Sort, Radix Sort, Address Calculation Sort, Summary of Sorting.

**04**

*Ps*

**Unit VI** 03  
**Searching:** Searching-Sequential & Binary Searching, Search Trees-Height Balanced, Weight Balance, 2-3 Trees, Tree Structures.

**Unit VII** 03  
**Hashing:** Hash Table Methods-Introduction, Hashing Functions, and Collision-Resolution Techniques.

**Unit VIII** 04  
**File Structure:** Definition of Record, File, Blocking, Compaction and Database, introductory overview of Database Management System, Implementation and Traders of Sequential Access, Index Sequential Access, Random Access, B-Trees, Inverted List and Multi list.

**Self Study:**

The self study contents will be declared at the commencement of semester. Around 10% of the questions will be asked from self study contents.

**Laboratory Work:**

Laboratory work will be based on applications of the above syllabus with minimum 10 experiments to be incorporated.

**Suggested Readings<sup>^</sup>:**

1. E. Balagurusamy, Data structures using, McGraw Hill
2. Peter Brass, Advanced Data Structures, Cambridge University Press
3. Ellis Horowitz and Sartaj Sahni, Fundamentals of Data Structures in C, Silicon Press

L=Lecture, T=Tutorial, P=Practical, C=Credit

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<sup>^</sup>this is not an exhaustive list